

=> d bib ab 2, 10, 11, 14, 15, 19, 20, 22, 24, 26, 28, 32, 31, 33, 34, 37

L3 ANSWER 2 OF 37 MEDLINE
AN 1999331175 MEDLINE
DN 99331175 PubMed ID: 10402764
TI Changes in the composition of erythrocyte membrane during storage of blood
in di-(2-ethyl hexyl) phthalate [DEHP] plasticized poly vinyl chloride (PVC) blood storage bags.
AU Manojkumar V; Deepadevi K V; Arun P; Nair K G; Lakshmi L R; Kurup P A
CS Department of Biological Sciences, Peninsula Polymers Limited, Thiruvananthapuram.
SO INDIAN JOURNAL OF MEDICAL RESEARCH, (1999 Apr) 109 157-63.
Journal code: GJF; 0374701. ISSN: 0971-5916.
CY India
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199907
ED Entered STN: 19990806
Last Updated on STN: 19990806
Entered Medline: 19990727
AB Very little information is available on the changes in the erythrocyte membrane composition during storage of blood at 4 degrees C, particularly with respect to the glycosaminoglycans and glycoproteins. In view of this,
a detailed study was carried out on the changes in the membrane proteins, glycosaminoglycans (GAG), carbohydrate components of glycoproteins, cholesterol, phospholipids and vitamin E in blood stored in glass bottles and a di-(2-ethyl hexyl) phthalate (DEHP) plasticized PVC bag (Penpol **blood bag**). Blood was collected in CPDA solution in glass bottles and in Penpol **blood bags** and kept at 4 +/- 1 degrees C. Analysis was made immediately after blood collection and after 28 and 42 days. Significant increase in the total protein in the erythrocyte membrane was observed during storage of whole blood in glass bottles and Penpol **blood bag** at 4 degrees C. This increase was progressively more with increase in storage time.
Significant changes were also observed in GAG, carbohydrate components of glycoproteins, cholesterol, phospholipids and vitamin E in the erythrocyte membrane under these conditions. The protein:GAG ratio, protein:carbohydrate ratio, cholesterol:phospholipid ratio as well as protein:lipid ratio showed significant increase in the membrane. The extent of these changes was lower in the Penpol bag, indicating the stabilizing effect of DEHP on the erythrocyte membrane.

L3 ANSWER 10 OF 37 MEDLINE
AN 93160656 MEDLINE
DN 93160656 PubMed ID: 8431654
TI The selection of plastic materials for **blood bags**.
AU Carmen R
CS Miles Inc, Covina, CA 94701.
SO TRANSFUSION MEDICINE REVIEWS, (1993 Jan) 7 (1) 1-10. Ref: 49
Journal code: BE5; 8709027. ISSN: 0887-7963.
CY United States

DT Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA English
FS Priority Journals
EM 199303
ED Entered STN: 19930402
Last Updated on STN: 19970203
Entered Medline: 19930318
AB The procedures used in the preparation of blood components together with the processes used in the manufacture of multiple **blood bag** systems impose a unique combination of requirements that severely limits the selection of **plastics**. Plasticized PVC, the **plastic** used in the first **blood bags** introduced by Carl Walter over 40 years ago, remains the material of choice today. **Blood bag** material research has focused on two areas: (1) the development of containers with increased gas permeability for the storage of platelet concentrates; and (2) the reduction or elimination of plasticizer contamination of stored blood components. This research has led to the development of several second-generation containers that have improved the quality and extended the allowable storage period of platelet transfusion products. **Plastics** virtually free of extractives are available for the storage of platelets and plasma, but elimination of plasticizers from RBC products has not yet been achieved.
L3 ANSWER 11 OF 37 MEDLINE
AN 93032101 MEDLINE
DN 93032101 PubMed ID: 1412680
TI Five-day storage of platelets in a non-diethylhexyl phthalate-plasticized container.
AU Snyder E L; Aster R H; Heaton A; Grode G; Napychank P; Kagen L; Jeffries L C; Hedberg S; Buchholz D H
CS Department of Laboratory Medicine, Yale University School of Medicine,
New Haven, Connecticut.
NC HL02035 (NHLBI)
SO TRANSFUSION, (1992 Oct) 32 (8) 736-41.
Journal code: WDN; 0417360. ISSN: 0041-1132.
CY United States
DT (CLINICAL TRIAL)
(CONTROLLED CLINICAL TRIAL)
Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 199211
ED Entered STN: 19930122
Last Updated on STN: 19960129
Entered Medline: 19921123
AB A non-diethylhexyl phthalate (DEHP)-plasticized **blood bag** for 5-day storage of random-donor platelet concentrates has been developed. The **plastic** bag is composed of polyvinylchloride **plastic** with a butyryl trihexyl citrate plasticizer. The suitability of this **plastic** for the storage of platelet concentrates for use in clinical transfusion practice was evaluated. In vitro storage studies showed no significant differences at Day 5 for a series of in vitro assays (test **plastic** vs. control **plastic**) including pH (7.31 vs. 7.44), lactate dehydrogenase

discharge (21.8 vs. 17.1%), pO₂ (103 vs. 120 torr), osmotic recovery (52 vs. 57%), and morphology score (527 vs. 516). For paired radiolabeled recovery and survival data from autologous blood donors, results showed equivalence between the test **plastic** and two control **plastics**. A small but significant difference between test and control **plastics** in regard to survival was found by using a linear computer model, but not with a gamma function (multiple-hit) model.

For paired transfusions to thrombocytopenic patients, the corrected count increments at 1 to 4 hours (test vs. control) were 13,534 versus 15,494

(p

> 0.05, NS). Similar results were seen for corrected count increments determined at 12 to 24 hours. It can be concluded that platelets stored in

the test **plastic** are acceptable for use in clinical practice.

L3 ANSWER 14 OF 37 MEDLINE

AN 90194860 MEDLINE

DN 90194860 PubMed ID: 2316209

TI The platelet storage capability of different **plastic** containers.

AU Wallvik J; Akerblom O

CS Department of Clinical Immunology and Blood Transfusion Service, Karolinska Hospital, Stockholm, Sweden.

SO VOX SANGUINIS, (1990) 58 (1) 40-4.

Journal code: XLI; 0413606. ISSN: 0042-9007.

CY Switzerland

DT Journal; Article; (JOURNAL ARTICLE)

LA English

FS Priority Journals

EM 199004

ED Entered STN: 19900601

Last Updated on STN: 19900601

Entered Medline: 19900426

AB Platelet concentrates (PC), prepared by platelet apheresis, were stored in

four different types of **blood bags**. One of the bags, manufactured with a thinner PVC film than previously, was tested in three different bag volumes. From 25 donors a total number of 99 PC were prepared. Platelet numbers varied from 20 to 140 X 10⁹ platelets per bag. The cell count, pH, pO₂, pCO₂ and lactate were determined initially and on days 1, 3 and 5 of storage. In a separate test, the oxygen diffusion capacity of the bags was determined by oxidation of sodium sulfite in the presence of cobaltous chloride. The oxygen diffusion capacity found was 16 (PL 732, 300 ml), 13.5 (Teruflexa 800 ml), 11.5 (PL 1240, 400 ml), 10.6 (Teruflexa 600 ml), 9 (Teruflexa 400 ml) and 4 (PL 146, 300 ml) μ mol O₂/h, respectively. For each bag type, the minimum and maximum platelet number stored with maintained pH levels (6.9-7.4) was defined. The maximum platelet number stored with maintained aerobic metabolism, correlated to the oxygen diffusion capacity of the bag, $r = 0.998$, p less than 0.001, $n = 6$; thus the maximum platelet number successfully stored for 5 days in each container can be predicted by determination of the oxygen diffusion capacity. In PC with a low platelet yield, pH values above 7.4 were observed after 1 and 3 days. When the results are compared with platelet yield data from routine blood banking, the optimal bags for platelet storage can be chosen. These conclusions must be further investigated in studies *in vivo*.

L3 ANSWER 15 OF 37 MEDLINE

AN 88250913 MEDLINE
DN 88250913 PubMed ID: 3289468
TI Toxicological quandary of the use of bis (2-diethylhexyl) phthalate (DEHP)
as a plasticizer for **blood bags**.
AU Myhre B A
CS Department of Pathology, Harbor-UCLA Medical Center, Torrance 90509.
SO ANNALS OF CLINICAL AND LABORATORY SCIENCE, (1988 Mar-Apr) 18 (2) 131-40.
Ref: 45
Journal code: 532; 0410247. ISSN: 0091-7370.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LA English
FS Priority Journals
EM 198807
ED Entered STN: 19900308
Last Updated on STN: 19900308
Entered Medline: 19880725
AB Plastic bags are very useful containers for the storage of blood and blood products since they are relatively transparent, hard to break, can be sealed aseptically with a radio-frequency current, and can be centrifuged for the isolation of blood components. In order to make the plastic more flexible, various agents are added, of which the most common is di- (2-ethylhexyl) phthalate (DEHP). This plasticizer has been found to leach from the plastic into the blood components during the storage period. Some animal studies have shown that this chemical can produce cancers and various tissue abnormalities. The human data from multi-transfused patients do not clearly indicate any specific damage; however, because of the animal studies, work has been carried out to find a non-leachable plasticizer. Several have been found: unfortunately, when survival studies are done, the red cell life span of the stored blood is decreased. Current work seems to indicate that DEHP has a membrane stabilizing function that prolongs the storage time of the red cell. Therefore, there currently is a trade off between plasticizer presence and red cell life span that must be considered when designing new blood storage bags.
L3 ANSWER 19 OF 37 MEDLINE
AN 86152900 MEDLINE
DN 86152900 PubMed ID: 3952787
TI Platelet storage for 7 days in second-generation **blood bags**.
AU Hogge D E; Thompson B W; Schiffer C A
NC 1P50CA32107-01 (NCI)
SO TRANSFUSION, (1986 Mar-Apr) 26 (2) 131-5.
Journal code: WDN; 0417360. ISSN: 0041-1132.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198604
ED Entered STN: 19900321
Last Updated on STN: 19970203
Entered Medline: 19860408
AB Plastic storage bags designed to optimize O2 and CO2 transfer to

preserve platelets for 7 days prior to transfusion were studied *in vivo* and *in vitro*. Platelets stored 7 days in second-generation CLX bags were compared to platelets stored 3 days in standard (CL-3861) 3-day storage bags and platelets transfused within 24 hours of collection. The CLX bags maintained concentrate pH at a mean of 6.85 ± 0.03 (SEM) after 7 days, while in standard bags after 3 days of storage, the mean pH was 6.46 ± 0.03 . A smaller proportion of platelets stored 7 days in CLX bags were discarded because of a pH less than 6.0 compared to those stored 3 days

in

CL-3861 bags (10 vs 21%). Poststorage pH showed strong correlation with concentrate platelet count and weak correlation with concentrate white cell count in both bag types. There was no significant difference in the mean corrected platelet count increments between platelets stored 7 days in second generation CLX bags and those stored 3 days in CL-3861 bags (10,000 and 12,200 at 1 hour, and 7000 and 7500 at 24 hours, respectively)

following transfusion to 16 thrombocytopenic recipients. However, transfusion of fresh platelets achieved mean corrected increments at both 1 and 24 hours posttransfusion that were higher than seen with either group of stored platelets (20,100 at 1 hour and 10,800 at 24 hours). Platelets can be stored 7 days in second-generation CLX **blood bags** with results comparable to those of platelets stored 3 days in standard bags.

L3 ANSWER 20 OF 37 MEDLINE
AN 85066808 MEDLINE
DN 85066808 PubMed ID: 6506180
TI Incorporation of plasticizer into red cells during storage.
AU Rock G; Tocchi M; Ganz P R; Tackaberry E S
SO TRANSFUSION, (1984 Nov-Dec) 24 (6) 493-8.
Journal code: WDN; 0417360. ISSN: 0041-1132.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198501
ED Entered STN: 19900320
Last Updated on STN: 19900320
Entered Medline: 19850117
AB The development of flexible **plastic blood bags** has permitted effective blood component production and therapy. However, the plasticizer di(2-ethylhexyl)phthalate (DEHP), whose toxicity in humans is still undefined, is known to leach from the **plastic** into stored blood. Despite the availability of bags made of **plastics** not using DEHP, the collection and storage of red cells is still done in DEHP plasticized packs, and in fact the storage life for red cells has recently been increased up to 49 days using new anticoagulant-preservative solutions. We examined the relationship between DEHP and stored red cells. We found that 28 percent of available ^{14}C -DEHP binds immediately to sites in both the membrane and cytosol fractions of the red cells, and that the total amount and distribution of ^{14}C -DEHP does not change significantly over 7 days. When red cell concentrates were stored with or without DEHP, using either **plastic** (polyolefin) bags not containing DEHP or glass, definite reduction in the osmotic stability of the red cells was found in the absence of DEHP. Plasma-free hemoglobin levels were 90.3 mg

per dl after 35 days of storage in **plastic** packs containing DEHP and 181.7 mg per dl in the polyolefin bags. The advantages of improved in vitro stability of red cells stored in **plastics** containing DEHP must be weighed against the potential hazards of patient exposure to DEHP.

L3 ANSWER 22 OF 37 MEDLINE
AN 85018357 MEDLINE
DN 85018357 PubMed ID: 6385482
TI Invention and development of the **blood bag**.
AU Walter C W
SO VOX SANGUINIS, (1984) 47 (4) 318-24.
Journal code: XLI; 0413606. ISSN: 0042-9007.
CY Switzerland
DT (CLINICAL TRIAL)
Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198411
ED Entered STN: 19900320
Last Updated on STN: 19900320
Entered Medline: 19841120

L3 ANSWER 24 OF 37 MEDLINE
AN 84046889 MEDLINE
DN 84046889 PubMed ID: 6415919
TI Platelet concentrates stored at 22 degrees C need oxygen. The significance of **plastics** in platelet preservation.
AU Wallvik J; Akerblom O
SO VOX SANGUINIS, (1983) 45 (4) 303-11.
Journal code: XLI; 0413606. ISSN: 0042-9007.
CY Switzerland
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 198312
ED Entered STN: 19900319
Last Updated on STN: 19900319
Entered Medline: 19831217
AB Platelet concentrates prepared by platelet apheresis were stored in **plastic blood bags** with different gas permeability properties. Inadequate oxygen supply gave an insufficient adenosine triphosphate (ATP) regeneration and a compensatory increase in glycolysis and lactic acid production, giving a rapidly falling pH. At pH below 6.0 the glycolysis was inhibited, oxygen consumption ceased, and ATP dropped towards depletion. Adequate oxygen supply kept the lactic acid production low with small pH changes only, and allowed a sufficient ATP regeneration. The release of alpha-granular platelet Factor 4 (PF4) was almost total at pH below 6.0, while at intact metabolic function there was a slow release of PF4. Platelet preservation is enhanced by the use of **blood bags** with adequate gas exchange properties. In our study one polyvinyl chloride **plastic** (PVC) bag gave poor results, while another PVC bag and a polyolefin bag showed intact metabolism for 5 days and a moderate release of PF4.
done

L3 ANSWER 26 OF 37 MEDLINE
AN 80146976 MEDLINE
DN 80146976 PubMed ID: 538392
TI [Release of diethyl-2-hexyl phthalate from stored blood on contact with polyvinyl chloride].
Relargage du di-(ethyl-2, hexyl) phtalate dans le sang conserve au contact
du chlorure de polyvinyle.
AU Friocourt M P; Picart D; Saleun J P; Floch H H
SO REVUE FRANCAISE DE TRANSFUSION ET IMMUNO-HEMATOLOGIE, (1979 Sep) 22 (4)
343-58.
Journal code: SIG; 7509497. ISSN: 0338-4535.
CY France
DT Journal; Article; (JOURNAL ARTICLE)
LA French
FS Priority Journals
EM 198005
ED Entered STN: 19900315
Last Updated on STN: 19970203
Entered Medline: 19800514
AB Softness and flexibility of PVC are due to the addition of plasticizers
in high concentration; the most used of them for blood storage bags is DEHP.
In this work, a method for labelling DEHP with ^{14}C from ^{14}C phthalic anhydrid is given. A piece of PVC from a commercial **blood bag** is labelled, in our laboratory, with ^{14}C DEHP and used to follow the kinetics of DEHP leaching in blood during storage. It is also used to study the influence of some parameters such as lipids amount of blood, shaking, and **plastic** sterilisation on this leaching. DEHP leaching is a three steps phenomenon and the level is not correlated to lipids content of blood. Thermal treatment of PVC and shaking have an influence on leaching. DEHP is not metabolised during blood storage at 4 degrees C and can not be detected as free molecule; it is absorbed on plasmatic proteins.

L3 ANSWER 28 OF 37 MEDLINE
AN 78098358 MEDLINE
DN 78098358 PubMed ID: 622821
TI Di-2-ethylhexylphthalate (DEHP) content of blood or blood components stored in **plastic** bags.
AU Sasakawa S; Mitomi Y
SO VOX SANGUINIS, (1978) 34 (2) 81-6.
Journal code: XLI; 0413606. ISSN: 0042-9007.
CY Switzerland
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Priority Journals
EM 197803
ED Entered STN: 19900314
Last Updated on STN: 19900314
Entered Medline: 19780329
AB Di-2-ethylhexylphthalate (DEHP) is a plasticizer used in the manufacture of **plastic** bags for blood products, which may be toxic. No more than a trace (less than 0.1 microgram/ml) could be detected in anticoagulants in **blood bags**, or in the blood of healthy untransfused subjects. A mean of 23 microgram/ml was found in ACD whole blood after 2 weeks storage, and 46 microgram/ml after 3 weeks; the corresponding figures for packed cells were 39 and 45 microgram/ml. The

level in CPD whole blood was similar. Fresh frozen plasma and cryoprecipitate contained 7 microgram/ml, while levels of 1.0 and 0.7 microgram/ml of DEHP were found in the blood of two patients who had received massive transfusions. Most DEHP in stored blood was associated with plasma lipoproteins.

L3 ANSWER 32 OF 37 MEDLINE
AN 73030056 MEDLINE
DN 73030056 PubMed ID: 5082191
TI Migration of a phthalate ester plasticizer from polyvinyl chloride **blood bags** into stored human blood and its localization in human tissues.
AU Jaeger R J; Rubin R J
SO NEW ENGLAND JOURNAL OF MEDICINE, (1972 Nov 30) 287 (22) 1114-8.
Journal code: NOW; 0255562. ISSN: 0028-4793.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Abridged Index Medicus Journals; Priority Journals
EM 197301
ED Entered STN: 19900310
Last Updated on STN: 19900310
Entered Medline: 19730103

L3 ANSWER 31 OF 37 MEDLINE
AN 73240632 MEDLINE
DN 73240632 PubMed ID: 4125312
TI What's in a **blood bag**?.
AU McCrae H R
SO LANCET, (1973 Sep 8) 2 (7828) 560-1.
Journal code: LOS; 2985213R. ISSN: 0140-6736.
CY ENGLAND: United Kingdom
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Abridged Index Medicus Journals; Priority Journals
EM 197310
ED Entered STN: 19900310
Last Updated on STN: 19980206
Entered Medline: 19731025

L3 ANSWER 33 OF 37 MEDLINE
AN 73028969 MEDLINE
DN 73028969 PubMed ID: 5081668
TI Preservation of red cell 2,3-DPG and viability in bicarbonate-containing medium: the effect of **blood-bag** permeability.
AU Beutler E; Wood L A
SO JOURNAL OF LABORATORY AND CLINICAL MEDICINE, (1972 Nov) 80 (5) 723-8.
Journal code: IVR; 0375375. ISSN: 0022-2143.
CY United States
DT Journal; Article; (JOURNAL ARTICLE)
LA English
FS Abridged Index Medicus Journals; Priority Journals
EM 197301
ED Entered STN: 19900310
Last Updated on STN: 19900310
Entered Medline: 19730103

L3 ANSWER 34 OF 37 MEDLINE

AN 69275356 MEDLINE
DN 69275356 PubMed ID: 5753650
TI Studies on **plastics** for medical uses. IX. Analyses of plasticizer and heavy metals in PVC **blood bags** and sets.
AU Horibe T; Mizumachi S; Kikuchi H
SO EISEI SHIKENJO HOKOKU. BULLETIN OF NATIONAL INSTITUTE OF HYGIENIC SCIENCES, (1968) 86 122-7.
Journal code: BQ8; 0421152. ISSN: 0077-4715.

CY Japan
DT Journal; Article; (JOURNAL ARTICLE)
LA Japanese
FS Priority Journals
EM 196910
ED Entered STN: 19900101
Last Updated on STN: 19970203
Entered Medline: 19691015

L3 ANSWER 37 OF 37 MEDLINE
AN 65148109 MEDLINE
DN 65148109
TI STUDIES ON **PLASTICS FOR MEDICAL USES. 8. PLASTIC BLOOD BAGS.**
AU FUJII M; SATO H; ITO H; HORIBE T; SHIMAMINE M; SHINOZAKI M; KIKUCHI H; TAKEUCHI M; MIURA S
SO EISEI SHIKENJO HOKOKU. BULLETIN OF NATIONAL INSTITUTE OF HYGIENIC SCIENCES, (1964 OCT) 82 90-2.
Journal code: BQ8. ISSN: 0077-5002.
CY Japan
DT Journal
LA Japanese
FS OLDMEDLINE
EM 196512
ED Entered STN: 19990716
Last Updated on STN: 19990716

=> d his

(FILE 'HOME' ENTERED AT 11:11:21 ON 17 JUL 2001)

FILE 'MEDLINE' ENTERED AT 11:11:30 ON 17 JUL 2001

L1 166 S BLOOD BAG
L2 48797 S PLASTIC
L3 37 S L1 AND L2

=> log hold

| COST IN U.S. DOLLARS | SINCE FILE ENTRY | TOTAL SESSION |
|----------------------|------------------|---------------|
| FULL ESTIMATED COST | 5.00 | 5.15 |

SESSION WILL BE HELD FOR 60 MINUTES
STN INTERNATIONAL SESSION SUSPENDED AT 11:15:30 ON 17 JUL 2001

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(FILE 'HOME' ENTERED AT 14:12:06 ON 17 JUL 2001)

FILE 'USPATFULL' ENTERED AT 14:12:17 ON 17 JUL 2001

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| L1 | 768444 S PD>19961101 |
| L2 | 6145 S METHYLENE BLUE |
| L3 | 216675 S BLOOD OR PLASMA OR PLATELET OR ERYTHROCYTE |
| L4 | 874 S L1 AND L2 AND L3 |
| L5 | 54932 S VIRUS OR VIRAL OR PATHOGEN |
| L6 | 432 S L4 AND L5 |
| L7 | 82488 S PVC OR (POLYVINYL CHLORIDE) OR POLYVINYLCHOLRIDE |
| L8 | 432 S L6 AND L6 |
| L9 | 34 S L6 AND L7 |

=> log hold

| COST IN U.S. DOLLARS | SINCE FILE ENTRY | TOTAL SESSION |
|----------------------|------------------|---------------|
| FULL ESTIMATED COST | 31.00 | 31.15 |

SESSION WILL BE HELD FOR 60 MINUTES
STN INTERNATIONAL SESSION SUSPENDED AT 14:24:43 ON 17 JUL 2001